



The Early Cretaceous weevils from Sierra del Montsec, Spain (Insecta: Coleoptera: Curculionoidea)

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The weevils from the Lower Cretaceous of Sierra del Montsec, Lleida, Spain, are revised. *Montsecbelus* gen. nov. is established for *Eobelus solutus* Whalley & Jarzembowski and placed in the family Belidae. *Jarzembowskia edmundi* gen. et sp. nov. is described within the family Eccoptarthridae (= Caridae). The third weevil recorded by Whalley & Jarzembowski (1985) is unidentifiable below superfamily level.

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KEY WORDS: fossil insects; new genus; new species; Coleoptera: Curculionoidea; Early Cretaceous, Spain.

1. Introduction

The beetle superfamily Curculionoidea (weevils) is very unevenly represented in upper Mesozoic assemblages. It is one of the numerically dominant beetle groups in the Upper Jurassic of Karatau in Kazakhstan (Arnoldi *et al.*, 1977) and in some Lower Cretaceous localities in the Russian Far East (Gromov *et al.*, 1993). However, many other fossil insect assemblages are poor in weevils. This is especially true of the European Mesozoic where, for instance, no weevils have been recorded from the famous Upper Jurassic insect 'lagerstätte' of Solnhofen (Germany). It is unclear whether this reflects an impoverishment of the Mesozoic European beetle fauna or is a taphonomic bias. In living weevils wing reduction is widespread, especially in island faunas, and flightless insects are generally poorly represented in fossil assemblages. Perhaps flightless weevils were a significant part of the beetle fauna inhabiting the archipelagos existing in the Mesozoic over much of present-day Europe (Barron *et al.*, 1981; Funnel, 1990). However, some (though not all) Mongolian Mesozoic insect assemblages are also poor in weevils, and very few finds have been recorded from China which was then part of a large continental mass (Chen, 1987). In the southern continental land masses weevils are well represented in the Lower Cretaceous of Santana, Brazil (Zherikhin & Gratshev, in prep.) but are absent from a large collection of similar age (Aptian) from Koonwarra, Australia (Jell & Duncan, 1986).

The diversity of weevils in the Upper Jurassic of Kazakhstan is so great that any postulated trophic connection with particular plant groups which are poorly represented in the European Mesozoic seems unlikely. A palaeoclimatic explanation is equally unlikely because during the Jurassic and Cretaceous Europe (poor in weevils) and Kazakhstan (rich in them) enjoyed a warm subtropical climate while Siberia (rich) was temperate, and in the Early Cretaceous both Europe and the temperate Russian Far East (rich) were moist areas with a maritime climate

contrasting with the more arid inland areas of Kazakhstan and Mongolia (poor) (Krassilov, 1985; Naidin *et al.*, 1986; Vakhrameev, 1988). Thus the distribution pattern of Mesozoic weevils cannot be interpreted in a simple way. Perhaps a number of European Mesozoic weevils is represented in various collections by disarticulated elytra and their remains lie unrecognized. Only a future comparison of all available material in more detail may help to resolve this problem.

The Lower Cretaceous of Sierra del Montsec in Lleida Province, northeastern Spain, is one of the few sources of Mesozoic weevils in Europe, and is important despite the low yield. Three specimens were recorded by Whalley & Jarzembowski (1985) and no additional material is recognized in a review of the Montsec insect fauna by Martínez-Delclòs (1991), who also discussed the general geological and palaeoecological setting. We have re-examined the specimens described by Whalley & Jarzembowski and housed in The Natural History Museum, London, including the holotype of the only previously named species, *Eobelus solutus*, and the results of our studies are presented below. The material is still too scarce to compare usefully with Asiatic fossil faunas, and further collecting is highly desirable.

2. Systematic palaeontology

Order Coleoptera Linnaeus, 1758

Suborder Polyphaga Emery, 1886

Superfamily Curculionoidea Latreille, 1802

Family Belidae Schoenherr, 1826

Subfamily Eobelinae L. Arnoldi, 1977

This group is treated here in the strict sense (as equivalent to the tribe Eobelini of Arnoldi in Arnoldi *et al.*, 1977); most other taxa of Eobelidae *sensu* Arnoldi should be transferred to the family Nemonychidae (Zherikhin & Gratshev, 1995).

Genus *Montseobelus* gen. nov.

Type species. *Eobelus solutus* Whalley & Jarzembowski, 1985.

Diagnosis. Medium-sized eobelines with pronotum and elytra distinctly and densely tuberculate.

Description. Body of moderate size, elongate, comparatively strongly sclerotized. Rostrum longer than head and pronotum combined, slender, nearly straight, originating probably from ventral surface of head. Free labrum probably absent. Mandibles small, probably narrow, weakly projecting forwards. Antennae inserted in apical half of rostrum, long, slender, first antennal segment not incrassate, longer than second; funicular segments longer than broad, gradually shortening to club; seventh funicular segment broader than preceding, densely setose, forming a transition to loosely three-segmented, long, rather narrow, densely setose, fusiform club. Head subconical, frons probably about as wide as base of rostrum and convex; eyes comparatively small, about as wide as rostrum, rounded, possibly slightly convex, lateral in position; temples about as long as eyes. Pronotum wider than long, widest behind midlength, rounded at lateral sides, densely and coarsely granulose, probably with weak lateral ridge. Fore-coxae round, close to hind margin of prothorax. Mid-coxae round, moderately widely separated. Metathorax moderately long. Hindcoxae slightly narrowed outwards, reaching elytral margin. Elytra elongate, nearly parallel-sided, granulose, lacking striae, with narrow flattened lateral margin. Abdominal sternae flat,

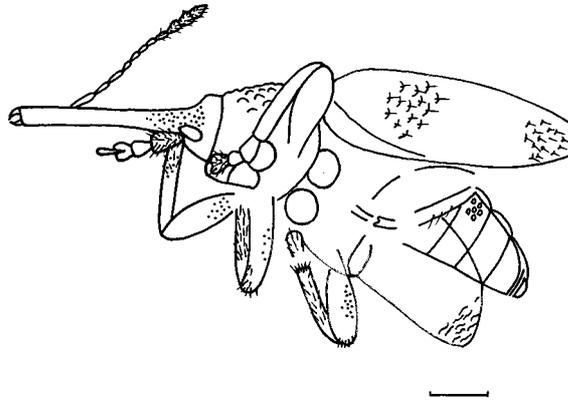


Figure 1. *Montsecobelus solutus* (Whalley & Jarzembowski), holotype In. 59510, combined from part and counterpart. Scale 1.0 mm.

subequal in length; anal sternite rounded at apex. Femora not clavate, not thickened, unarmed; hindfemora not reaching apex of abdomen. Tibiae straight, stout, simple, about as long as femora. Foretarsi with first segment widened (possibly a sexual character), second slightly narrower, third distinctly bilobed. Hindtarsi narrow.

Composition. Monobasic.

Comparison. Differs from all previously known Eobelinae in possessing a distinctly tuberculate pronotum and elytra. The broadened foretarsi resemble *Archaeorrhynchus* Martynov but the forefemora are not incrassate and the antennal insertion is more distal.

Montsecobelus solutus (Whalley & Jarzembowski, 1985) comb. nov.

Figure 1

1985 *Eobelus solutus* Whalley & Jarzembowski: p. 400, fig. 17

Description. Body and legs moderately dark whereas rostrum, antennae and probably tarsi paler. Rostrum 1.2 times longer than head and pronotum combined and 10 times longer than wide, nearly parallel sided, bare; at base rather coarsely and sparsely punctate, distal punctae becoming progressively finer and disappearing at level of antennal insertions. Antennae inserted at one third of length of rostrum from its apex; first antennal segment slightly wider than second and 1.7 times longer, slightly widened distally, about 5 times longer than broad; funicular segments slightly but distinctly clavate, first two equal in length, about 3 times longer than broad, third 1.2 times shorter, fourth to sixth gradually shortening with sixth about 1.8 times longer than broad, seventh distinctly wider and 1.3 times longer than sixth, about 2 times longer than broad; club as long as last four funicular segments combined, its maximal width exceeding 1.3 times apical width of last funicular segment; first two segments of club obconical, first about as long as broad, second a little longer, third oviform, acuminate at apex, slightly longer than second. Frons with rather coarse and sparse punctae similar to those of base of rostrum. Pronotum 1.2 times wider than long, widest at basal one fourth, at base 1.3 times wider than at apex, probably convexly arcuate at base and longitudinally convex, with dense and coarse small tubercles possessing short setae and becoming smaller laterally. Elytra 2.6 times longer than

pronotum and 1.6 times longer than broad, gently narrowing to broadly rounded apex behind midlength, rather flat dorsally, moderately densely tuberculate, each tubercle possessing a small seta. Abdominal sterna finely and rather sparsely punctate, anal sternite with small fine setae. Femora finely and rather densely punctate, at apex with moderately long, fine recumbent pubescence; fore femora about as long as pronotum, hind femora slightly longer and stouter, extending beyond base of fourth ventrite. Tibiae about as wide as rostrum, finely and rather densely punctate, with moderately dense and long fine recumbent setae directed to apex. Fore tarsi about as long as tibiae, dorsally covered with long setae directed obliquely forward, with first segment triangular, 1.6 times longer than broad, at apex slightly wider than tibia, second half as long and 1.3 times narrower than first, third slightly shorter, as long as broad; onychium long, clavate, 2.5 times longer than broad, its free apical portion 1.2 times longer than third segment. First two segments of hind tarsi probably subequal in length, well over 1.5 times longer than broad.

Dimensions. Body length of unique specimen, 6.7 mm (rostrum excluded).

Material. Holotype In. 59510, part (well preserved, almost complete beetle, probably a male) and counterpart (elytra, meso- and metathorax and abdomen); collected by J.M. Wonnacott, January 1960. No additional specimens are known. *Stratum typicum.* "Calcaires lithographiques à Plantes et Vertébrés de la Pedrera de Rúbies" (Martínez-Delclòs, 1991), Lower Cretaceous, probably Barremian/Aptian.

Locus typicus. Rúbies, near Sta. Maria de Meià, Sierra del Montsec, Lleida Province, Spain.

Family Eccoptarthridae L. Arnoldi, 1977, stat. nov.

1977 Eccoptarthrini L. Arnoldi, in Arnoldi *et al.*, p. 169.

1992 Caridae Thompson, p. 882.

1993 Baissorhynchini Zherikhin, in Gromov *et al.*, p. 30.

1994 Caridae Zimmermann, p. 499.

1995 Eccoptarthrinae Zherikhin & Gratshev, p. 651.

This family was earlier tentatively treated by us as a subfamily within the Belidae (Zherikhin & Gratshev, 1995) but the wing venation of modern Australian *Car* illustrated by Zimmermann (1994), as well as a number of important synapomorphies established for the living, and partially also for the extinct, genera (Kuschel, 1992, 1995; Thompson, 1992; Zimmermann, 1994) justify raising it to a family as proposed earlier by Thompson (1992) and Zimmermann (1994) who named it Caridae (for synonymy, see Zherikhin & Gratshev, 1995). We agree with Kuschel (1992, 1995) who placed the Early Cretaceous genera *Cretonanophyes* Zherikhin and *Baissorhynchus* Zherikhin near *Car* Blackburn and related living Australian and South American genera, and one more Early Cretaceous genus, *Emanrhynchus* Zherikhin, might be added to the family. The Upper Jurassic genus *Eccoptarthrus* L. Arnoldi also belongs here, and thus Eccoptarthrini L. Arnoldi, 1977 is the oldest family-group name available for the group (Zherikhin & Gratshev, 1995), having priority over Caridae Thompson, 1992, Caridae Zimmermann, 1994, and Baissorhynchini Zherikhin, 1993.

Jarzembowskia gen. nov.

Type species. *Jarzembowskia edmundi* Zherikhin & Gratshev, sp. nov.

Etymology. After Dr E. A. Jarzembowski.

Diagnosis. Eccoptarthrids with long straight rostrum, small eyes, and impressed elytral suture.

Description. Body small, compact, strongly sclerotized. Rostrum longer than head and pronotum combined, separated from head by very shallow impression, nearly straight, originating from midheight of head, rather stout, in side view gradually narrowing from base to supposed point of antennal insertion. Mandibles small, non-exodontous, with large subbasal tooth at inner edge. Antennae probably inserted in basal half of rostrum, slender, non-geniculate; first antennal segment not reaching base of rostrum; funicular segments longer than broad; club distinct, oval, moderately broad, as long as four last funicular segments combined. Head short, subglobular; frons distinctly wider than base of rostrum, hardly convex; eyes small, round, dorsolateral in position, placed closer to upper surface of head than to its underside, their diameter much less than height of rostrum at base; temples extremely short, without postocular constriction. Pronotum longitudinally almost flat, nearly truncate at base, probably with weak lateral ridge. Forecoxae large, conical, close to hind margin of prothorax. Metepisterna large, subtriangular. Elytra short and wide, convex, impressed basally along suture, with basal margin vertical, and with narrow, flattened side margin with distinct, regular, coarse punctate rows; second row distinctly impressed. Hind wings with apical field probably about 0.5 of total wing length or slightly less, with radial cell broad, triangular, and window large; anterior stripe distinct, narrow; central sclerotizations distinct, radiomedial sclerotization long and wide, longitudinal; mediocubital cell rounded at apex, Cu1 moderately long, arched. Abdomen about half as long as elytra, its segments subequal in length. Femora moderately stout, not clavate, unarmed; fore femora not incrassate; hind femora not reaching apex of abdomen. Tibiae straight at external edge, distinctly emarginate at base at internal edge, stout, simple, about as long as femora; fore tibiae obliquely truncate at apex. All tarsi with first segment distinctly widened, second narrower, truncate at apex in fore- and mid-legs, emarginate in hind pair, third distinctly bilobed; onychium rather short, claws widened at base.

Composition. Monobasic.

Comparison. Similar to other Mesozoic genera in that the rostrum is distinctly longer than head and pronotum combined and forecoxae are closer to base of prothorax than to its apex, but differs from them in having a straight, stout rostrum, and from all previously described genera in having much smaller eyes and the elytra impressed basally along the suture. The shape of the tibiae and tarsal segments is also distinctive.

Jarzembowskia edmundi Zherikhin & Gratshev, sp. nov.

Figure 2

1985 weevil, sp.1 [*partim*] Whalley & Jarzembowski, p. 400, fig. 19

Diagnosis. As for genus.

Description. Body and appendages uniformly dark. Rostrum 1.3 times as long as head and pronotum combined, distinctly and not densely punctate throughout, punctures clearly elongate. Antennae capable of reaching approximately mid-length of pronotum; funicular segments clavate, covered with fine suberect setae, third and fourth funicular segments subequal in length, about twice as long as broad, fifth and sixth shorter, about 1.5 times as long as broad, seventh wider and c. 1.5 times longer, about twice as long as broad; segments of club subequal

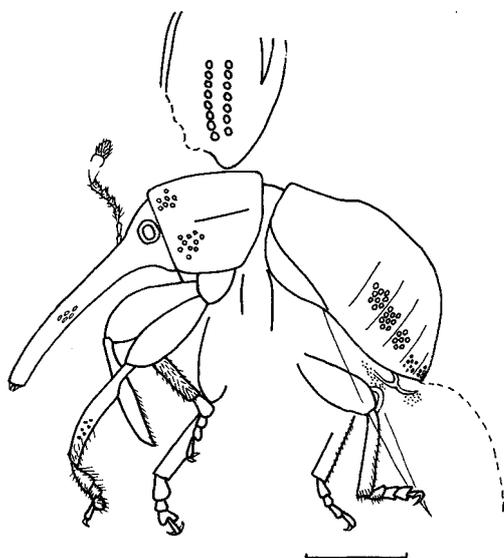


Figure 2. *Jarzembowskia edmundi* Zherikhin & Gratshev, gen. et sp. nov., holotype In. 49648. Scale 1.0 mm.

in length, longer than broad, densely setose. Pronotum lacking distinct pubescence, coarsely punctate, distance between points subequal to their diameter, lateral sides somewhat rugosely punctate. Elytra about 1.5 times longer than pronotum and probably hardly longer than broad, strongly and regularly sloping to apex from their midlength; punctures in rows, round, large and dense, almost contiguous; intervals at least 1.5 times as broad as rows, probably flat or only slightly convex, lacking distinct pubescence. Forelegs distinctly longer than others. Femora lacking distinct pubescence, fore femora about as long as pronotum; hind femora extending beyond base of fourth ventrite. Tibiae finely and densely punctate, densely covered with rather short, fine, somewhat raised setae. Tarsi 1.6 times shorter than corresponding tibiae, covered dorsally with rather long suberect setae; fore tarsi with first segment about 1.6 times longer than broad, triangular, and 1.3 times as broad and almost 2.5 times longer than second, the latter as long as broad, subquadrate, subtruncate at apex, third slightly wider than second, as long as broad; onychium slender, subcylindrical; mid tarsi generally similar in shape to the fore pair but a little less broad; hind tarsi shorter, with second segment distinctly emarginate at apex.

Dimensions. Body length of unique specimen, 3.3 mm (rostrum excluded).

Material. Holotype In. 49648, almost complete well-preserved beetle, sex uncertain; collected by J.M. Wonnacott, August 1955. No additional specimens are known.

Stratum typicum. "Calcaires lithographiques à Plantes et Vertébrés de la Pedrera de Rúbies" (Martínez-Delclòs, 1991), Lower Cretaceous, probably Barremian/Aptian.

Locus typicus. Quarry near Rúbies, Sta. Maria de Meià, Sierra del Montsec, Lleida Province, Spain.

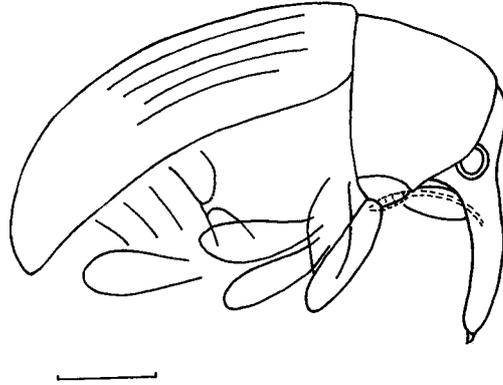


Figure 3. An unidentified weevil, In. 49658, drawn from the part and counterpart. Scale 0.5 mm.

Curculionoidea: family, genus and species uncertain

Figure 3

1985 weevil, sp.1 [*partim*] Whalley & Jarzembowski, p. 400, fig. 18

The specimen, In. 49658 from a quarry near Rúbies, Sta. Maria de Meià, collected by J. M. Wonnacott in August, 1955, shows too little morphological detail to be identified below the level of the superfamily. It is certainly different from the two other specimens (above), at least at the generic level. The rostrum is as long as the pronotum, distinctly and regularly curved; the antennae seem to be straight (not geniculate), short and inserted near the base of the rostrum. The elytra are striate and two basal ventrites are short. This specimen most probably belongs to either the Eccoptarthridae or the Attelabidae.

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